1.0 INTRODUCTION

1.1 History of Griffy Lake Nature Preserve

Bloomington Water Company, a public utility company, originated in 1923 with the intent to build a dam on Griffy Creek in an attempt to ease periodic water shortages caused by leaking reservoirs on the west side of Bloomington (League of Women Voters, 1971). The dam was constructed at its present location in 1924 and with it, Griffy Lake was created. By 1934, the City of Bloomington acquired ownership of the water treatment plant located adjacent to Griffy Lake and much of the surrounding property. At that time, the dam was increased in size to reach 44 feet in height (644 feet mean sea level) and measures 900 feet in length holding approximately 1,280 acre-feet of water storage. In 1984, the Griffy Lake Water Treatment Plant processed 7.5 million gallons per day (Jones et al., 1984). In 1995, the Griffy Lake Water Treatment Plant was decommissioned; however, Griffy Lake remains as a back-up water supply to the City of Bloomington, while the Griffy Lake Nature Preserve (GLNP) is a popular destination for hiking, fishing, boating, wildlife observation, and other outdoor recreational activities.

Griffy Lake and the Griffy Lake Nature Preserve are City-owned and under the control of the City of Bloomington Utilities Services Board. An agreement between the Utilities Services Board and the Board of Parks and Recreation allows for activity development and recreational facility maintenance for the property to occur under the purview of the Board of Parks and Recreation. All activities which occur within the Griffy Lake Nature Preserve boundary are required to be compatible with the long-term strategy of using Griffy Lake as a drinking water source.

Nonetheless, Griffy Lake Nature Preserve is a very popular destination for area residents. In fact, the *Community Attitude and Interest Citizen Survey, Findings Report*, conducted for the City of Bloomington, Park and Recreation Department by Leisure Vision in December 2006 found that:

- 32% of respondent households visited GLNP over the past 12 months (2006);
- 24% of respondent households chose GLNP as one of the top three parks they visit most often.

These data suggest that Griffy Lake Nature Preserve is one of the choice destinations in the area and that it is likely to experience continued use in the near future.

1.2 Physical Characteristics

In total, the Griffy Lake Nature Preserve covers 1,180 acres including the 109 acre Griffy Lake on the north side of Bloomington (Figure 1). The Nature Preserve was formed from more than 45 property acquisitions which occurred between 1922 and 2007. A portion of the property is a state nature preserve that was dedicated in 1991. Indiana University owns approximately 1,100 acres on the south side of the Griffy Lake Nature Preserve including the area immediately south of Griffy Lake contained within the Indiana University Research and Teaching Preserve (IURTP). Property acquisition is on-going and as a point of reference, all surveys and property documentation occurred within the Griffy Lake Nature Preserve boundary as of May 2007. The Griffy Lake Nature Preserve is almost entirely contained within the Griffy Lake watershed, which stretches out to the east and south of the lake. The Griffy Lake watershed covers approximately 5,160 acres (Figure 2).

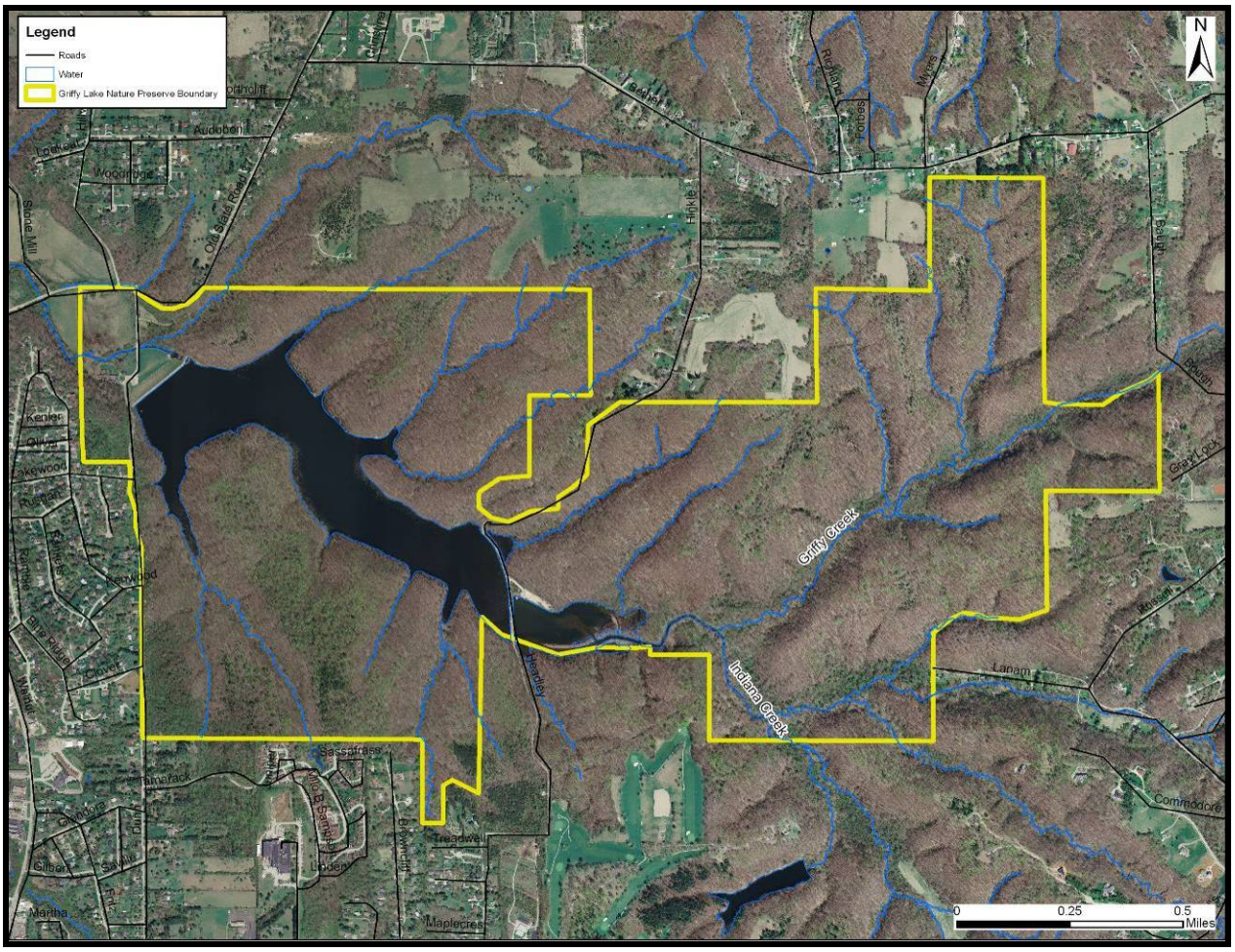

Figure 1. Griffy Lake Nature Preserve boundary.

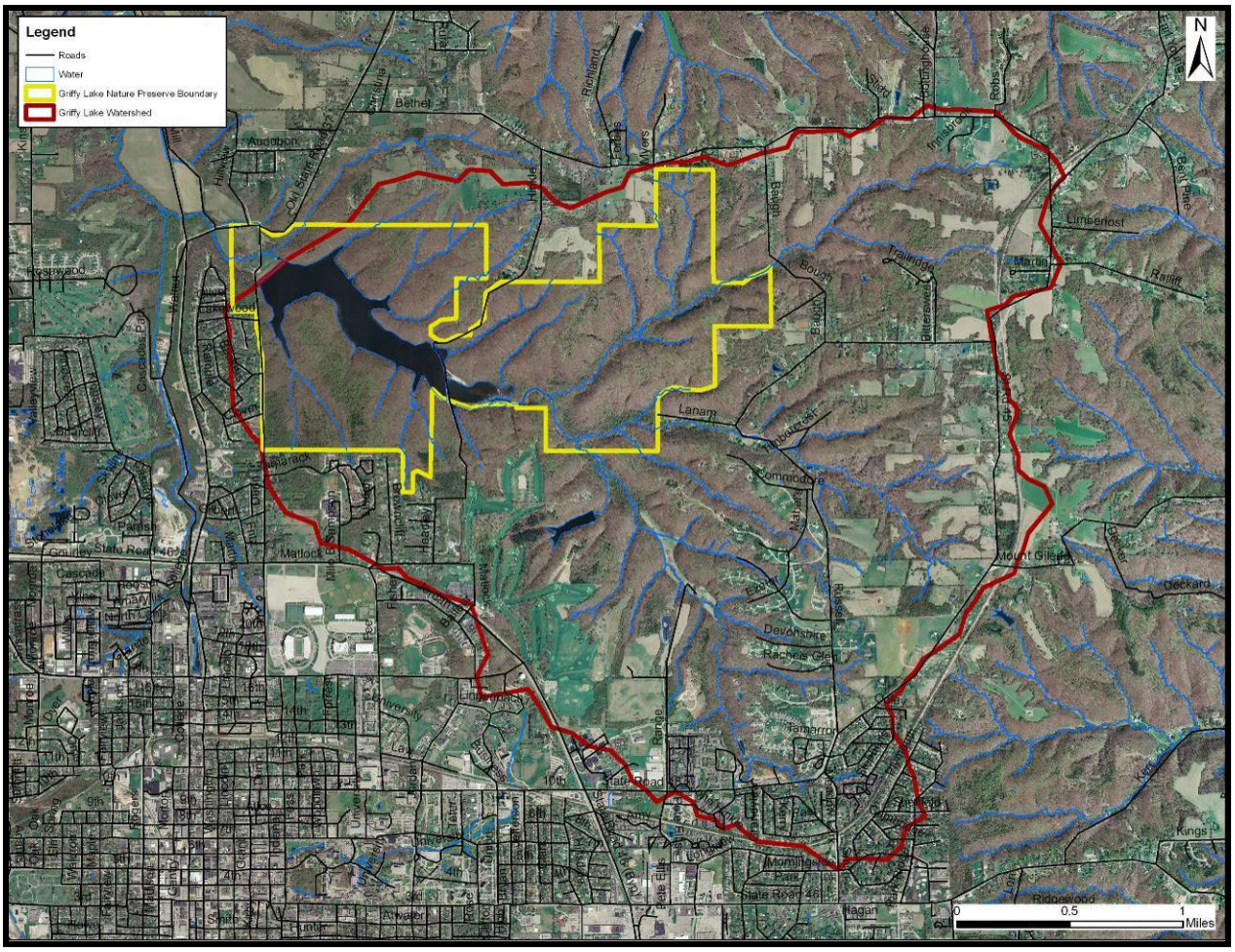

Figure 2. Griffy Lake watershed boundary.

1.3 Scope of Study

The overall goal of the current project is two-fold:

1. To establish a consensus community vision, and
2. To develop strategies and a funding plan to protect and preserve Griffy Lake Nature Preserve for future generations.

The current project builds on the original *Griffy Lake Long-Range Use and Management Plan* with the intent of preserving the ecological integrity of the Griffy Lake Nature Preserve while providing recreational opportunities throughout the property. With these ideals in mind, JFNew and their team from Indiana University Bloomington, The Eppley Institute, Indiana State University, Indiana University Northwest, and Woolpert, Inc. developed a program to identify the natural features and resources; document changes in land use, development, and adjoining property influences; and determine user values with relation to recreational opportunities, facilities, land acquisition, and property expansion. These tasks were completed through a series of field visits, public user surveys, open houses or public meetings, and through document review. All identified recommendations were discussed within the quarterly citizen steering committee meetings and were reviewed by the public during the project open houses. This report documents all surveys and reviewed items, and provides recommendations and estimated costs for future implementation efforts at Griffy Lake Nature Preserve.

2.0 ENVIRONMENTAL RESOURCES

Although the environmental resources were thoroughly reviewed in the *Griffy Lake Long-Range Use and Management Plan*, these items are details again herein as they form the foundation for all ecological and recreational activities which occur on the GLNP. As such, these environmental resources also demarcate constraints for the site with regards to potential recreational and land use options.

2.1 Geologic History

As detailed by Jones et al. (1984), the Griffy Lake watershed, and thus the Griffy Lake Nature Preserve, is considered highly dissected. This results in the exposure of Mississippian Age siltstone and shale of the Borden Group along with exposure of overlying Harrodsburg, Salem, and St. Louis limestones. The dissection is a result of lying south of the glacial boundaries within Indiana. This means that the substrate present is typically eroded bedrock which is sometimes covered by thin soils. The Griffy Lake Nature Preserve is located within the Norman Upland bedrock physiographic unit (Schneider, 1966). Flat-topped narrow divides, steep slopes, and deep V-shaped valleys characterize the Norman Upland. Schneider (1966) details the typical small stream patterns within this physiographic unit, like the branches of Griffy Creek, as possessing narrow or absent floodplains with steep slopes and characterizes larger streams as being marked by narrow, flat valleys with small floodplains. The dendritic drainage system that occurs within the Griffy Lake watershed is typical of watershed patterns within the Norman Upland. Gray (2000) further characterizes the Norman Upland as rugged topography with high relief where the extensive dissection of ridges and the deeply entrenched stream channels present in the Griffy Lake watershed and Griffy Lake Nature Preserve are commonplace within the Norman Upland.

The Griffy Lake watershed lies near the boundary of the Mitchell Karst Plain and the Brown County Hills Sections of the Highland Rim Natural Region (Homoya et al., 1985). The Mitchell Karst Plain Section is characterized by the karst plain, which is relatively level, although limestone cliffs and rugged hills are present in some areas, especially near the periphery of the section. Soils are generally well-drained silty loams derived from loess and weathered limestone. The Highland Rim Natural Region is unglaciated with large expanses of karst topography, including rugged hills and cliffs. The region was largely forested with small limestone and siltstone glades and gravel wash communities typically occurring in pre-settlement times. The Brown County Hills Section is specifically known for deeply dissected uplands which cover siltstone, shale, and sandstone. The soils within this section are typically thin, acid silt loams and bedrock is near the surface. The Griffy Lake Nature Preserve fits well into the characterization of the Brown County Hills Section of the Highland Rim Natural Region.

2.2 Topography

The topography of the Griffy Lake watershed and the Griffy Lake Nature Preserve is typical of the area. The highest areas of the watershed lie along the watershed's headwaters reaching elevations greater than 800 feet above mean sea level. Griffy Lake, elevation 633 feet above mean sea level, is the lowest point in the watershed. Figure 3 presents a topographical relief map of the Griffy Lake watershed.

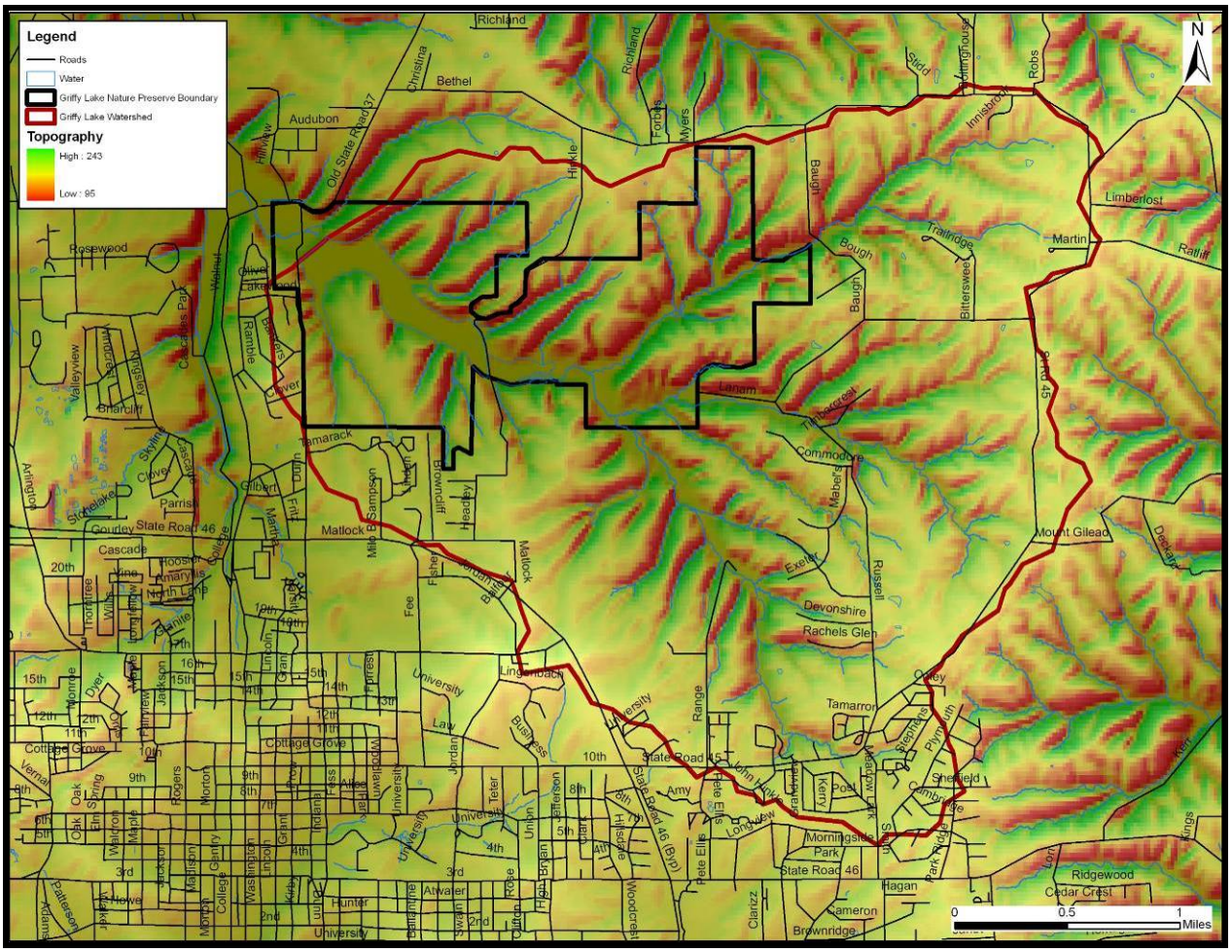

Figure 3. Topographical map of the Griffy Lake watershed.

The Griffy Lake watershed is characterized by relatively steep slopes. Slopes range from 0% to nearly 75%. The shallowest slopes, those measuring less than 2%, are located along ridgetops or in bottom valleys of the larger streams. Slopes increase below ridgetops to approximately two-thirds of the way along the entrenched stream channels. Here, surface slopes measure 9 to 27%. The highest slopes occur along the sandstone bedrock in the eastern portion of the watershed and are specifically located along the lake's shoreline (Figure 4). The impact of the variations in slope on the watershed and nature preserve's soils, flora, and fauna will be discussed in further detail in subsequent sections.

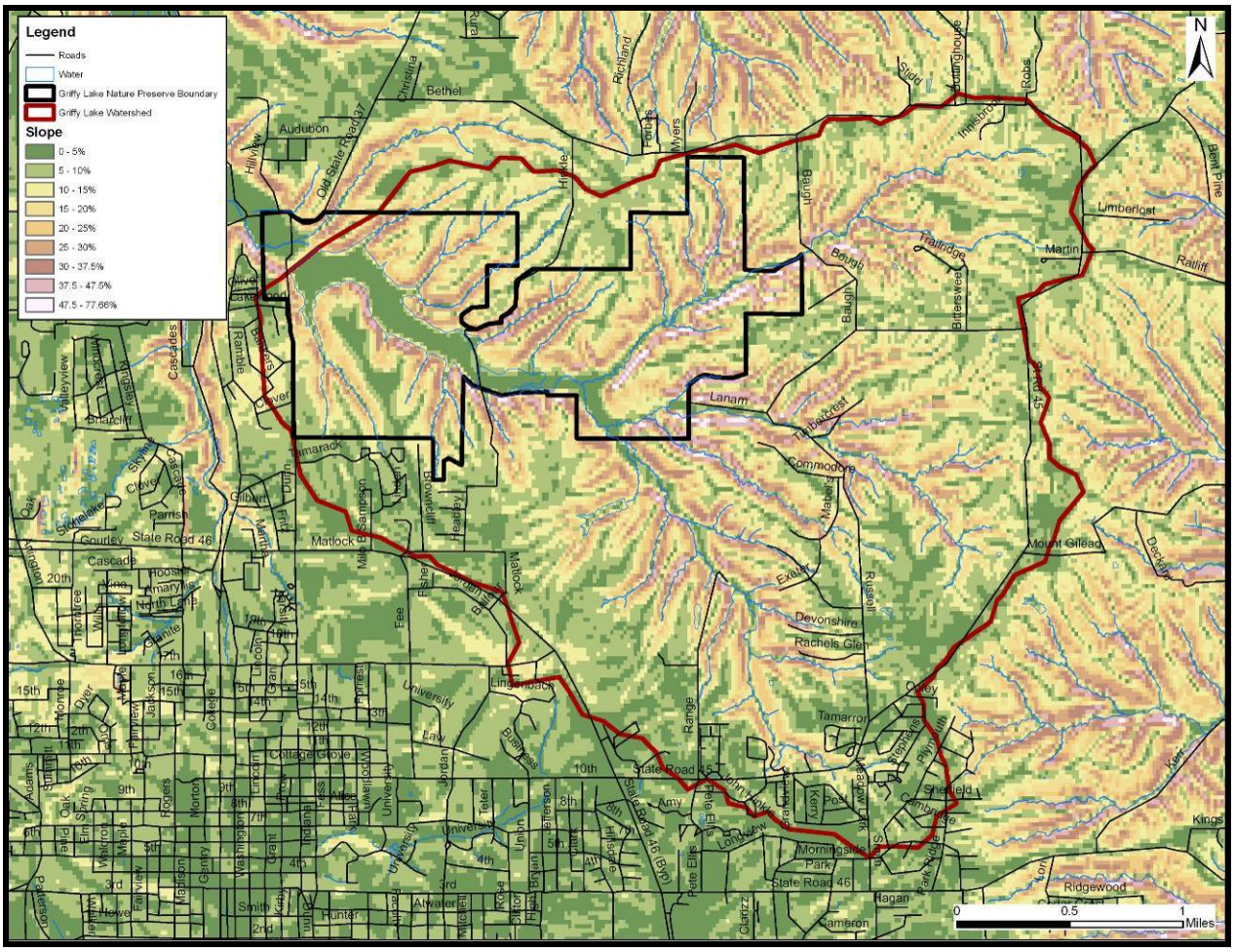

Figure 4. Slope variation within the Griffy Lake watershed.

2.3 Soils

The soils in the watershed consist mainly of silt loam with small percentages of sand and clay. Silt loam, or loess, soils are small, measuring 0.002 to 0.05 mm in diameter, and are easily transported by wind and water action. Because of these properties, soils within the Griffy Lake watershed and Griffy Lake Nature Preserve are relatively thin near stream channels and are only moderately deep on ridgetops or along moderately sloped areas. The soils within the watershed are also acidic due to their development under forested cover. Based on maps provided by Thomas (1981), the following soil series are located within the Griffy Lake watershed:

- Bedford silt loam soils: These soils are found on ridgetops in the eastern portion of the watershed, are moderately deep (48 to 96 inches to bedrock), with a moderately deep impermeable layer measuring 20 to 36 inches deep, and loess cap 20 to 50 inches thick. Bedford silt loam soils formed in loess and limestone residuum.

- Berks-Weikert silt loam soils: Berks-Weikert silt loam soils are found on the lowermost slopes (25 to 75% slopes) and are typically shallow measuring 10 to 40 inches to bedrock with coarse fragments at the base. These soils developed in siltstone and shale.

- Bonnie silt loam soils: These soils formed in acid, silty alluvium on typically inundated floodplains. These soils are typically deep, measuring up to 50 inches deep, and are typically poorly drained and moderately slowly permeable.

- Burnside silt loam soils: These soils formed on floodplains which are occasionally inundated. Burnside silt loam soils are moderately deep (40 to 54 inches to bedrock) with substantial coarse fragments due to their formation on coarse alluvium.

- Crider silt loam soils: These soils formed on ridgetops and upper sideslopes (typically 2 to18% slopes), are moderately deep (60 to 100 inches) with a loess cap measuring 20 to 45 inches thick. These soils formed in loess and limestone residuum.

- Caneyville silt loam soils: These soils are found at the heads of stream channels and along north facing slopes. Caneyville silt loam soils are shallow measuring 20 to 40 inches to bedrock with coarse base fragments. This soil formed in limestone residuum.

- Hagerstown silt loam: These soils are found near the heads of stream channels or along midslope areas (4 to 35% slopes) and are typically moderately deep (40 to 60 inches to bedrock) with a loess cap measuring 5 to 20 inches thick and coarse fragments at its base. Like most of the other watershed soils, Hagerstown silt loam formed in limestone residuum.

- Haymond silt loam soils: Haymond silt loam soils formed in silty alluvium on floodplains which are often inundated. These soils are typically deep measuring up to 60 inches to bedrock, somewhat poorly drained, and are moderately permeable.

- Gilpin silt loam: These soils are found along lower mid-slope areas (12 to 25% slopes) and are shallow (20 to 40 inches to bedrock) with coarse fragments at the base. Unlike many of the other soils in the watershed, Gilpin silt loam soils formed on siltstone and shale.

The soils at the Griffy Lake Nature Preserve are within the Berks-Weikert, Crider-Caneyville, and Haymond-Stendal soil map units (Thomas, 1981). Eleven soil units are present on the site (Figure 5). The most common soils on the site are Berks-Wiekert complex, 25-75% slopes; Caneyville silt loam, 12-18% slopes; Crider silt loam, 2-6% slopes; Crider silt loam, 6-12% slopes, and Hagerstown silt loam, 12-18% slopes. The soil units at the site can be generally split into three groups: soils formed in alluvium; soils formed in sandstone, siltstone, and shale residuum; and soils formed in limestone residuum (Thomas, 1981). In general, the soils formed in alluvium are present in the floodplains, the soils formed in sandstone, siltstone, and shale residuum are present on the steep slopes, and the soils formed in limestone residuum are present on the terraces (Figure 5). Because of the chemical makeup of underlying substrate and soil forming processes, soils formed in sandstone, siltstone, and shale residuum are shallow, dry, and acidic in nature, while those formed in limestone residuum are generally deeper, more moist, and neutral or alkaline. The soil chemistry has influenced the formation of the vegetation communities on the site. The specifics of this process will be detailed further in the natural community survey section of this report.

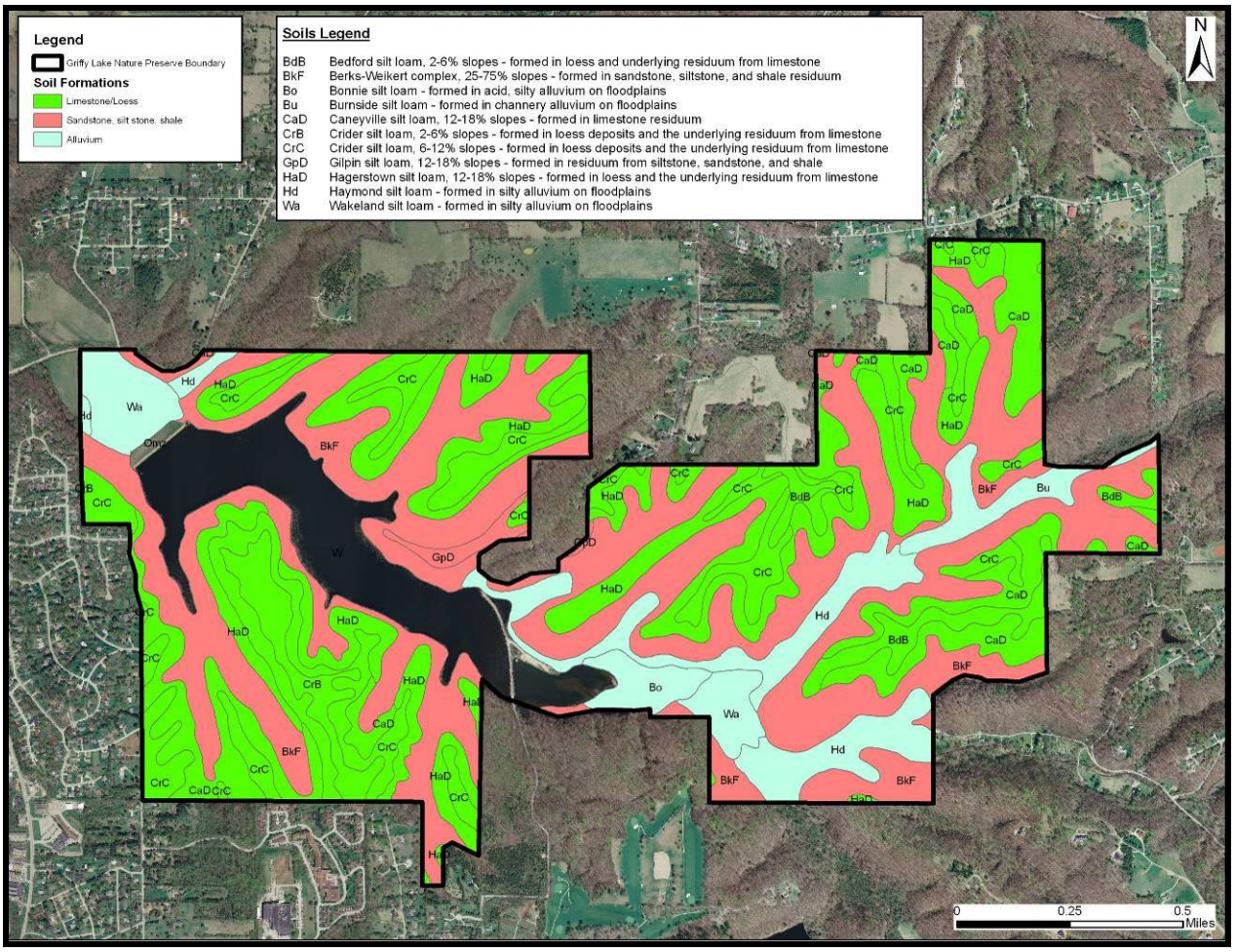

Figure 5. Soil formations and units present within the Griffy Lake Nature Preserve.

2.3.1 Highly Erodible Soils

As detailed by Jones et al. (1984), slope and the threat of erosion are the two greatest constraints placed on the Griffy Lake watershed and nature preserve. The best assessment for soil erosion concern relates to classification of soils by their erodibility. Specifically, soils are classified as highly erodible soils, potentially highly erodible soils, or neither. As implied by the name, highly erodible soils are the easiest to erode from the land surface. While potentially highly erodible soils (PHES) are also in danger of erosion, their potential is not as high as highly erodible soils (HES). As Figure 6 indicates, highly erodible soils cover a substantial portion (4750 acres or nearly 92%) of the Griffy Lake watershed. This acreage is spread throughout the watershed. Additionally, highly erodible soils cover nearly 78% of the Griffy Lake Nature Preserve. The highly erodible soils cover most areas of the watershed that are not covered by water or located within the wetland adjacent to Griffy Lake. Nearly the entire watershed is covered by highly erodible soils due to the thin nature of the soils present and the steep slopes located throughout the watershed and nature preserve. However, the highest concern for soil erosion is associated with the steep ravines located throughout the watershed and nature preserve and along the convex slopes adjacent to Griffy Lake's shoreline. These soils are typically Berks-Weikert and Caneyville silt loam soils. Specific erosion issues resulting from the prevalence of highly erodible soils within the nature preserve will be discussed in subsequent sections.

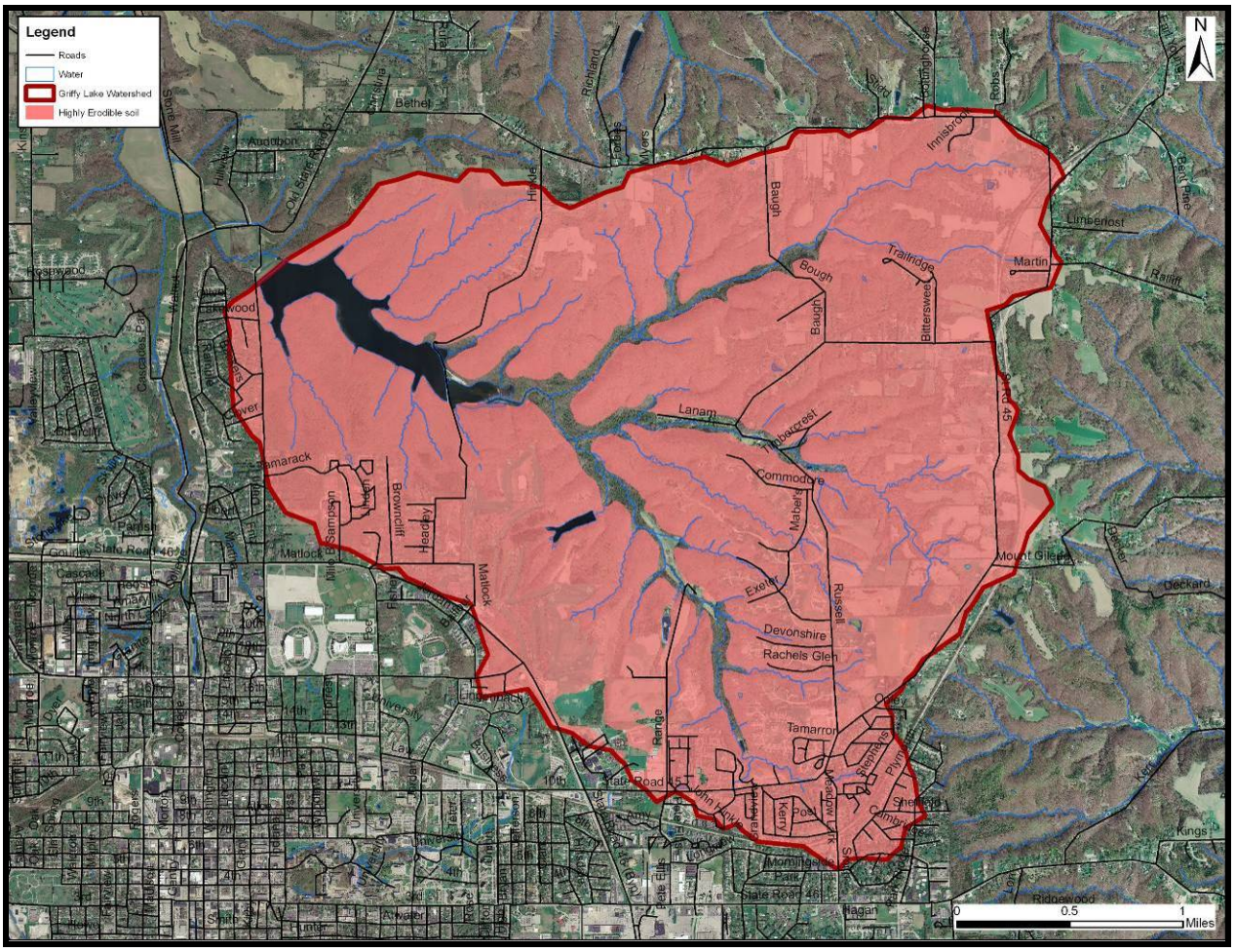

Figure 6. Soil erodibility (highly erodible and potentially highly erodible soils) within the Griffy Lake watershed.

2.3.2 Hydric Soils

A secondary concern for soils within the Griffy Lake watershed and thus the Griffy Lake Nature Preserve is the flooding or periodic inundation of the soils. Soils which formed under periodically flooded or wetland conditions are referred to as hydric soils. Figure 7 displays the limited distribution of hydric soils within the Griffy Lake watershed. Hydric soils cover approximately 10% of the Griffy Lake Nature Preserve but are present on less than 4% of the Griffy Lake watershed. Bonnie silt loam soils are found near the east end of the lake and are typically subjected to periodic inundation. This inundation typically occurs during the runoff season or from March to June and is exacerbated by the poor drainage present on these soils. Other floodplain soils, including Burnside silt loam, Haymond silt loam, and Wakeland silt loam soils, are subjected to inundation only during periodic high magnitude runoff events (50 to 75 year rain events).

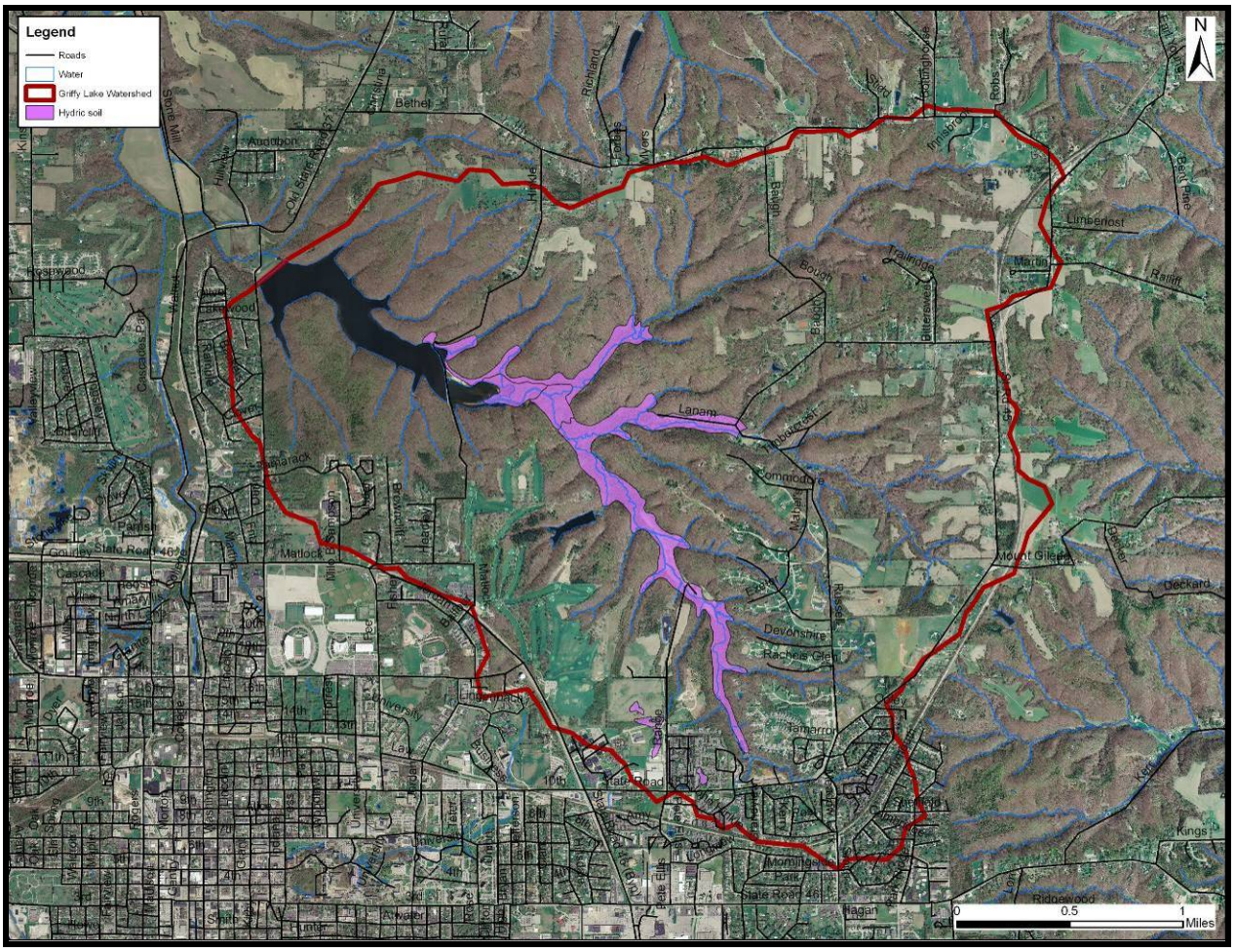

Figure 7. Hydric soils present within the Griffy Lake watershed.

3.0 PAST ACTIVITIES

3.1 1984 Plan Details

Most of the recommendations in the 1984 *Griffy Lake Long-Range Use and Management Plan* (Jones et al., 1984) have been implemented by the Bloomington Parks and Recreation Department. That this plan has successfully served to guide management activities at Griffy Lake for the past 23 years is quite remarkable, given that such plans typically have a ten-year lifetime. The 1984 Plan recommended implementation of program elements in three phases, based on priorities at the time. Below is a summary of these recommendations and their status today.

3.1.1 Phase I Recommendations and Current Status

1. Trail improvements to the most eroded sections.

   Some hiking trails have been stabilized with mulch on the walking surface, erosion reinforcements to maintain soil on steep areas, and with wooden walkways and stairs in steeper areas. This is an ongoing maintenance activity that has not kept up with erosion

problems on some trail segments. The **Facilities and Infrastructure Section** of this report details additional trail maintenance and improvement needs.

2. Site access measures: barriers, posting signage, bicycle racks.

   Barriers to discourage access by ATVs, bicycles, and horses have been placed at access points off Russell and Baugh roads. Signs have been posted at these and other access points. Signs, in particular, have a short life span as many are removed and destroyed by users presumably disgruntled by the restrictions. Bicycle racks were installed at the Hinkle Road parking area. Other bicycle racks are needed at other access points, such as the Griffy Dam parking lot and along the north end of the causeway near the north shore trailhead. The **Facilities and Infrastructure Section** of this report details additional access issues, signage needs, and biking and hiking needs.

3. Erosion controls at lake access points.

   This is an area that needs more attention. Shoreline re-vegetation with native herbaceous species and erosion control mats has been attempted but successful growth has been limited by lack of watering, the steep slopes, and the shallow clay soils. Foot traffic by people and dogs has also prevented vegetation from becoming established in many areas. Steps have been installed in a few locations; however, wooden structures have not been placed at lake access points other than the wooden dock near the boathouse. The **Natural Features Inventory Section** details continuing shoreline and streambank erosion issues, while the **Facilities and Infrastructure Section** details lake access needs.

4. Speed limit and/or rumble strips on Hinkle Road causeway.

   The speed limit on Headley Road has been reduced to 25 miles per hour; however, traffic calming devices have not been installed. New residential development at Grammercy Park and possible future developments north of the lake will likely increase the use of the causeway for commuter automobile traffic. Additional traffic will pose a hazard to pedestrians using the causeway for walking and to cars and bicycles entering and exiting the parking lot off the causeway. The **Facilities and Infrastructure Section** of this report details traffic calming needs along the causeway.

5. Interpretive nature trail – Hinkle Road parking lot.

   This trail was installed and is well-used and enjoyed by the public.

6. Canoe/row boat rentals.

   Canoe, row boat and kayak rentals are available during the summer months and on April and October weekends.

7. Sanitary facilities – Hinkle Road parking lot.

   Two vault toilets are available at the boathouse during the hours of operation. However, for security reasons this facility is locked when the boathouse is not staffed.

8. Marker buoys restricting boat access in eastern end of lake.

Buoys have been installed.

3.1.2 Phase II Recommendations and Current Status

1. Pedestrian walkway along causeway.

   This has not been implemented, although several grant applications have been prepared but not awarded. The **Facilities and Infrastructure Section** of this report details pedestrian access needs along the causeway.

2. Interpretive nature trail – Dunn Street site.

   This has not been implemented.

3.1.3 Phase III Recommendations and Current Status

1. Nature center building – Dunn Street site.

   This has not been implemented. The **Facilities and Infrastructure Section** of this report the community's opinion on a nature center and potential solutions.

4.0 ADJOINING PROPERTY INFLUENCES

4.1 Adjacent Land Use Changes Since 1984

Table 1 and Figures 8 and 9 show land use changes in the Griffy Lake watershed and Griffy Lake Nature Preserve between 1992 and 2005. These data are considered representative of the land use/land cover present within the Griffy Lake watershed during both the current planning period and during development of the previous master plan. Since the 1992 and 2005 land use data are from different sources, several of the categories from 1992 do not match corresponding categories for 2005. Several land uses were consolidated into broader categories to facilitate comparison between the datasets.

At the watershed level, there has been a conversion of open land (pasture, cropland, grassland) to high intensity residential land uses. Between the two dates, open field acreage decreased by 1,133 acres while high intensity residential land use increased by 1,325 acres. Other categories were roughly similar between the two time periods given the differences in the source data and classification of high intensity and low intensity residential land uses (Table 1).

Table 1. Land use changes in the Griffy Lake watershed, 1992 to 2005.

Land Use Category	Griffy Lake Nature Preserve		Griffy Lake Watershed	
	2005 (acres)	1992 (acres)	2005 (acres)	1992 (acres)
Forest	1,008.20	1,024.80	2,913.54	2,860.12
Open field[1]	10.77	24.67	503.26	1,636.30
High intensity residential	13.87	0.26	1,355.21	30.64
Low intensity residential	0	7.93	13.70	409.23
High intensity commercial	0	1.05	NA	90.65
Water[2]	134.46	107.35	176.47	112.31
Hardscape/right-of-way	14.90	NA	198.07	NA
Woody wetlands	NA	15.01	NA	18.25
TOTAL	1,182.20	1,181.06	5,160.25	5,157.49

[1] includes cropland, pasture, other grasses; [2] 2005 data includes streams and retention ponds
NA = category not included

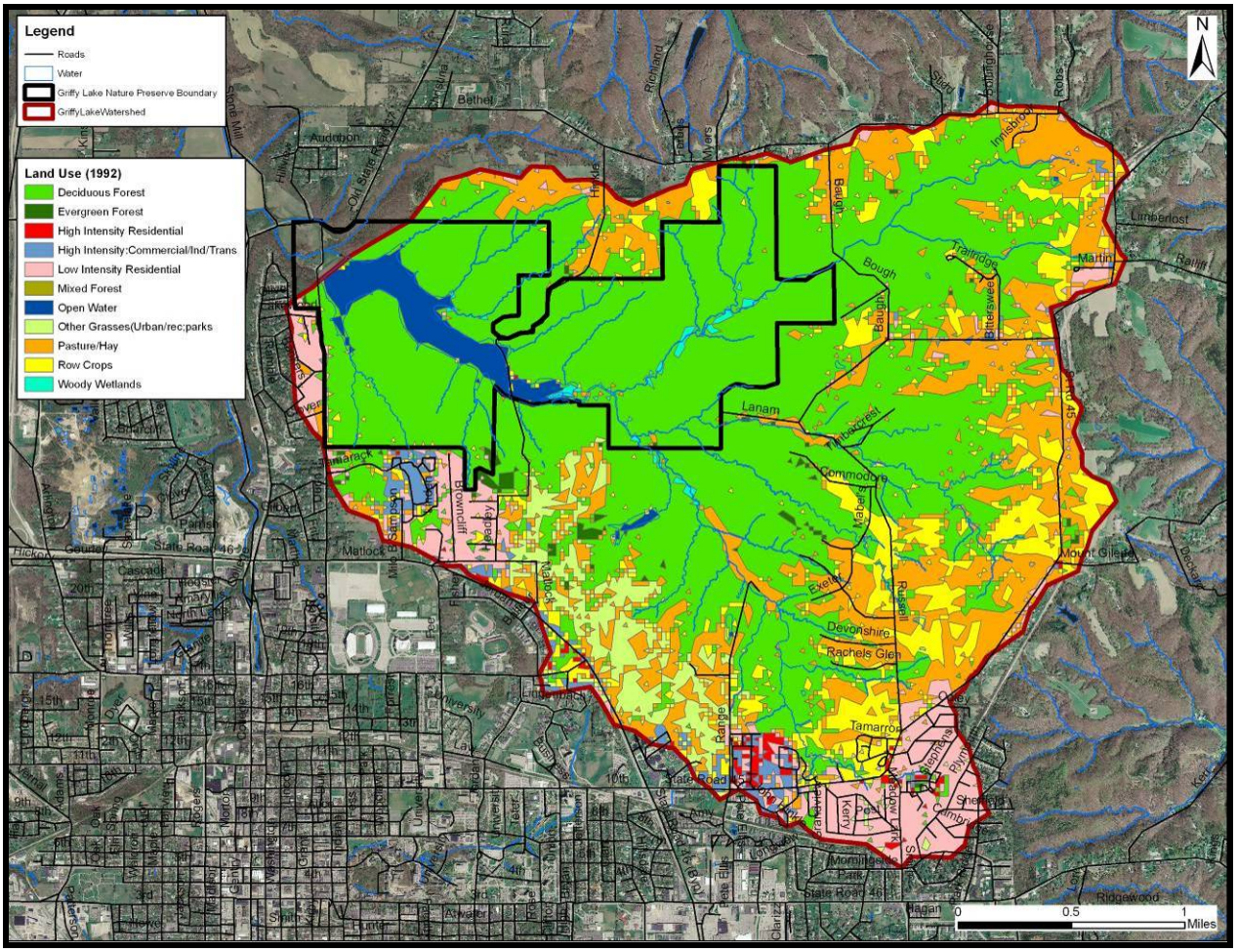

Figure 8. Land use categories for the Griffy Lake watershed, 1992.

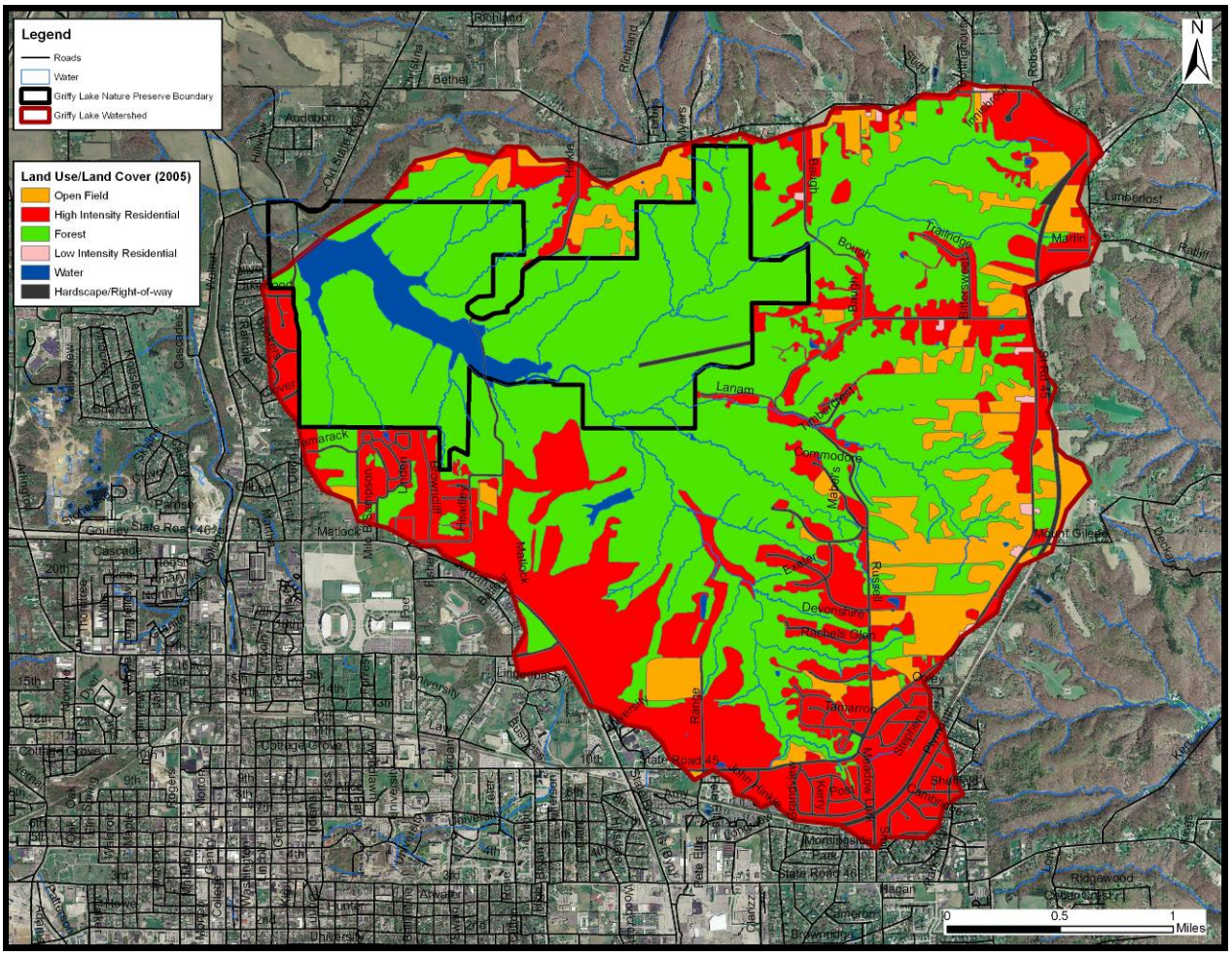

Figure 9. Land use categories for the Griffy Lake watershed, 2005.

Development in the Griffy Lake watershed can be better seen by comparing 1975 aerial photographs with the 2005 aerial coverage. (1975 aerials occurred closest in date to the 1984 master plan and are therefore being used for comparison purposes.) The Meadowood Retirement Community is the largest property that has been developed within Griffy Lake's watershed since 1975. The property is located immediately south of the Griffy Lake Nature Preserve (Figure 10). Additional expansion of this facility and Jill's House represent in-progress development within the watershed at the time of plan development. At the eastern edge of the watershed, a number of developments have occurred since 1975 and continue currently. These developments include Indiana University facilities along Range Road, expansion of Fountain Park, and construction of housing at Woodbridge, Tamarron, Devonshire, Rachel's Glen, and Timbercrest (Figure 11).

Figure 10. The Meadowood Retirement Community development represents the major land use change in the southern watershed since 1975. Source: 1975 aerial photograph.

Figure 11. Development in the southeastern part of Griffy Lake's watershed since 1975.
Source: 1975 aerial photograph.

4.2 Adjacent Land Use Effects

In addition to the steep slopes and shallow soils that characterize Griffy Lake's watershed, the numerous developing urban areas pose significant water quality challenges. Removal of the natural and protective vegetative cover during land-disturbing activities has the potential to increase water runoff and the concurrent loss of sediments, nutrients and pesticides.

There are numerous visual signs of these problems within the watershed. Some of these problems, observed during watershed reconnaissance, are shown in the map on Figure 12, and in the photographs following.

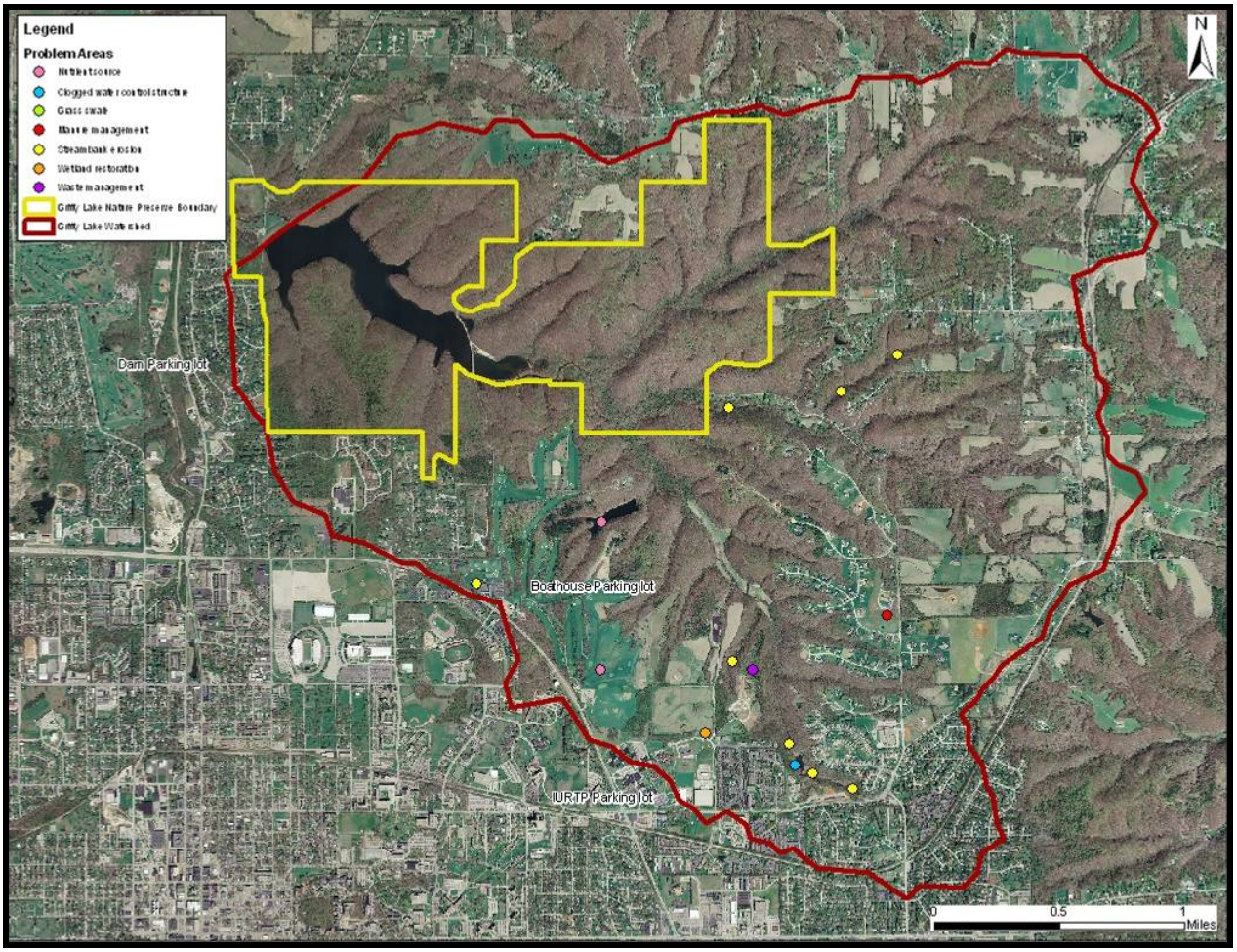

Figure 12. Water quality-based problem areas identified within the Griffy Lake watershed, March 2008.

Urban and suburban development replaces undisturbed land having higher water infiltration capacities with impervious surfaces (roofs, roads, parking lots, etc.) that allow no water infiltration. The result is an increase in runoff during storm events. The increased runoff may create erosion channels on the land and thereby increasing flow velocities of water in stream channels. The higher velocities contain more kinetic energy that erodes the bottom and sides of the existing stream channels. This eroded sediment, and nutrients and other materials, make their way down the channels to Griffy Lake. Representative problem areas related to streambed

and bank erosion are shown in Figures 13 and 14, while Figure 15 documents the impact of development within the watershed which results in reduced groundwater infiltration.

Figure 13. Streambed and bank erosion along Griffy Creek adjacent to Lanam Road.

Figure 14. Runoff from the Indiana University (IU) Foundation drains via a rip-rap lined ditch but substantial erosion is apparent where the rip-rap ends.

Figure 15. Runoff from the IU Motor Pool and Auxiliary Library Facility contribute to standing water along Range Road.

In order to prevent erosion, a stable vegetation cover should be reestablished following disturbances associated with new construction. Without a stable cover, precipitation and runoff cause soil erosion. Figures 16 to 18 illustrate examples of current development within the Griffy Lake watershed and the development's potential impact to Griffy Lake.

Figure 16. A gravel road to the storage area at the new IU Physical Plant building is unstable and erodes into Griffy Creek.

Figure 17. Equipment storage area leveled with fill dirt left a steep, unprotected embankment that erodes into Griffy Creek.

Figure 18. The new development at Grammercy Park sits on the edge of the Griffy Lake watershed. Such developments have the potential to increase water runoff, sediment loading, and nutrient loading.

Recreational facilities located within the watershed also may contribute contaminants to Griffy Lake. For example, the Indiana University Golf Course (Figure 19) lies within the South Fork Griffy Creek watershed. Erosion along ravines and streams adjacent to the golf course is visually apparent with on-going monitoring of water flow from these streams to the South Fork Griffy Creek being conducted by IURTP. Fertilizers and pesticides used at the golf course have the potential to drain directly into Griffy Creek and indirectly through University Lake. University Lake (Figure 20) is extremely eutrophic and could be a source of nuisance aquatic plants of the type being managed within Griffy Lake. At another location, the equestrian facility of Devonshire has an unprotected horse manure storage pile located on the edge of Griffy Creek (Figure 21) providing a source of nutrients, sediment, and pathogens to Griffy Lake.

Figure 19. The IU Golf Course lies within the South Fork Griffy Creek watershed.

Figure 20. University Lake is a hypereutrophic reservoir that receives drainage from the IU Golf Course.

Figure 21. The unprotected horse manure pile at the Devonshire equestrian facility.

Retention ponds are required in many instances to retain sediments, water, and pollutants generated during home construction within subdivisions. While these can be a benefit to clean water, they must be maintained. The outlet of the retention pond at Tamarron is clogged (Figure 22) creating substantial erosion at and below its spillway (Figure 23). The eroded sediment flows directly into the South Fork Griffy Creek and travels but a short distance to Griffy Creek.

Figure 22. Clogged water control structure in the Tamarron retention basin.

Figure 23. Eroded Tamarron retention pond outlet.

4.3 IURTP Collaboration Opportunities

The Indiana University Research and Teaching Preserve (IURTP) was created in 2001 by the Indiana University Board of Trustees to better facilitate research and teaching outside the traditional classroom. The 185-acre site (Figure 24) is adjacent to the Griffy Lake Nature Preserve and the Indiana University Championship Golf Course, and includes 1,500 feet of shoreline along Griffy Lake. The IURTP completely encloses University Lake. Topographic features include flat-topped elongate ridge tops, rugged, highly ravined slopes, and a wetland valley along south fork of Griffy Creek. Elevations range from 630 to 810 feet MSL. Additional information is available on the Preserve's website at: http://www.indiana.edu/~preserve.

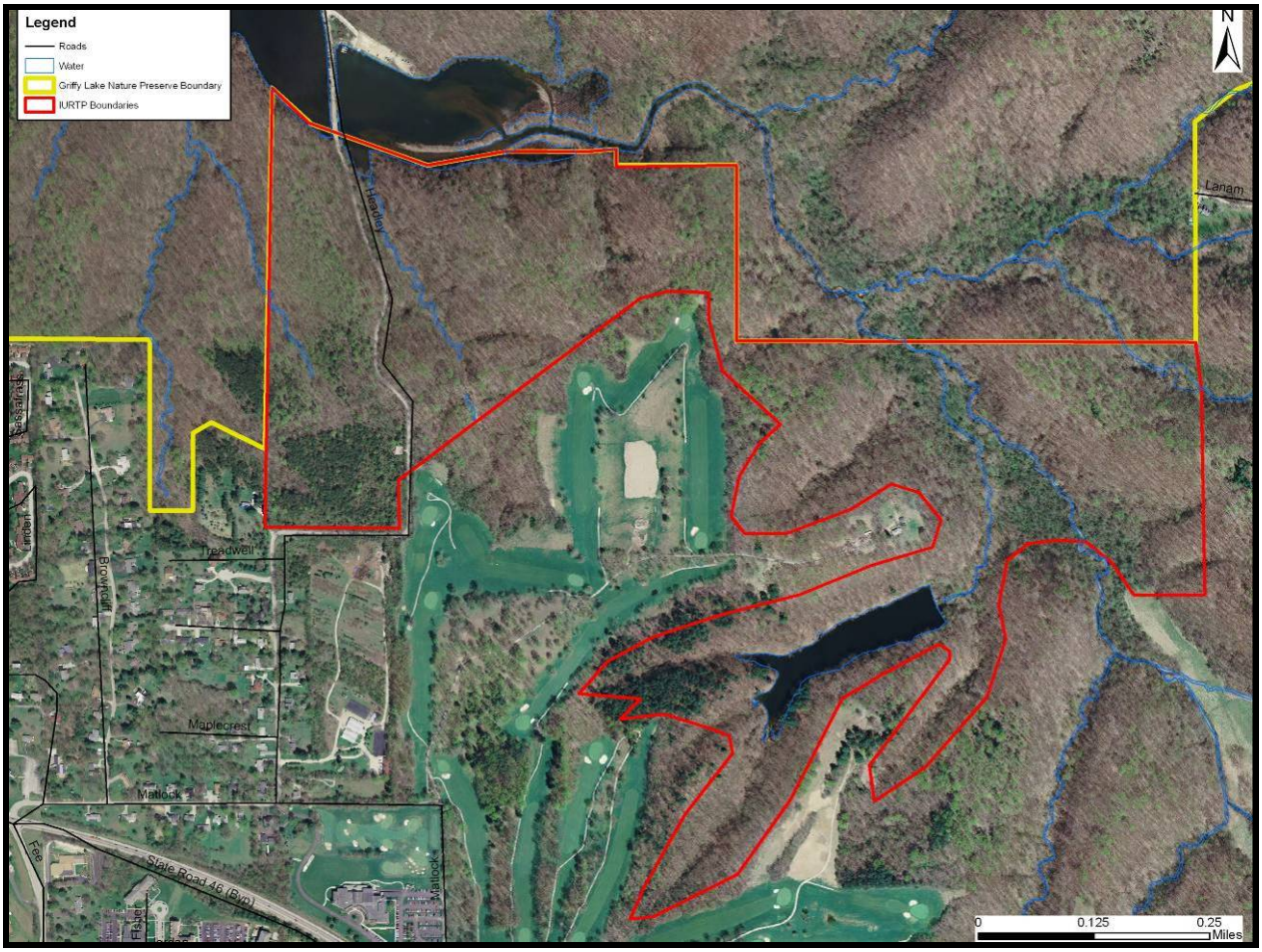

Figure 24. Indiana University Research and Teaching Preserve (IURTP) boundaries.

At a meeting with preserve Director Professor Keith Clay and assistant Angie Shelton, current environmental problems, human use concerns, and potential relationships between the GLNP and the IURTP were discussed. The following sections are based on this discussion.

4.3.1 Current Environmental Problems

Soil Erosion
Due to naturally steep slopes and shallow soils, and human and animal (domestic and wild) activities that remove the protective vegetation cover, soil erosion is a serious problem affecting the IURTP and the GLNP. Soil erosion in the upper watershed causes siltation in Griffy Creek and ultimately sediment deposition within Griffy Lake. Creek siltation destroys aquatic habitat by embedding rocky substrates and covering macroinvertebrate and fish eggs. Lake sedimentation decreases lake capacity and water depth, and provides substrate for expanding aquatic macrophyte populations.

Soil erosion along the banks of Griffy Creek and the shoreline of Griffy Lake are a further source of siltation and sediment deposition. Human use of these sensitive edges is a primary cause.

Deer Browse
The large deer population is stripping vegetation in the forest understory. This has destroyed plant and animal diversity in the most heavily browsed areas. These heavily browsed areas also provide opportunities for invasive species to become established. Experiments with exclosures visually show the effects of deer browse (Figure 25).

Figure 25. Deer heavily browsed the understory in the foreground in contrast to the exclosure in the background. Source: Angie Shelton.

Beaver Activity
Beavers are active on the southwest bank near the Griffy Lake dam and at University Lake. Small trees cut by beavers no longer stabilize the soil on steep slopes and beaver dens and lodges often destabilize dam structures and shorelines.

Invasive Species
Invasive plant species such as garlic mustard (*Alliaria petiolata*) and Japanese stilt grass (aka Nepalese browntop), *Microstegium vimineum*, are abundant in the IURTP. Of additional concern are bush and vine honeysuckle (*Lonicera maackii* and *Lonicera japonica*, respectively) and other woody shrubs, which are partially prevalent adjacent to roadsides and disturbed areas within IURTP. These invasive species out compete native species and reduce plant diversity. Seeds of thes species are often transported from upstream during periods of high rain and runoff leading to large invasions along creekbeds and floodplains.

4.3.3 Destructive Human Uses
Some human activities within the IURTP and GLNP are more damaging to the natural environment than are others. For example, all terrain vehicles (ATVs) access both properties via Russell Road. These vehicles damage vegetation, disrupt wildlife, and cause soil erosion. Mountain bicycles and horses, although prohibited, have also been seen within both properties.

IURTP staff has observed fire pits and signs of tents within the GLNP off the end of Matlock Road.

4.3.4 Areas for Potential Cooperation
The IURTP is a valuable partner with the City of Bloomington at the Griffy Nature Preserve. Both facilities share numerous policy and program goals.

- The IURTP has sponsored nature walks in the past. With City coordination and advertising, and IURTP staffing, such programs could reach a wider audience.
- Better cooperation between the IURTP and GLNP could address research issues of concern to both parties. Indiana University students could work on questions specific to the GLNP. A joint internship program could provide research and learning opportunities for University, Ivy Tech, and high school students. A small grants program could provide financial support for these internships and research projects.
- The IURTP is constructing a pavilion shelter near Griffy Creek (Figure 26). A footbridge across Griffy Creek near this point would provide important connectivity that could benefit both properties.
- Another area of potential cooperation is in the preparation of a coordinated map of both properties. Both the City and IURTP utilize Geographic Information Systems that could be merged and/or shared to facilitate this.